REMARKS

This amendment is responsive to the Office Action of June 28, 2002. Reconsideration of claims 1-22 and new claim 23 is respectfully requested.

The Office Action

The Restriction Requirement

The claims are subject to a restriction requirement. Applicants elect Group I, with traverse. The Examiner suggests that the product as claimed can be made by another and materially different process and that the product as claimed can made by forming the phosphor containing UV curable material on the light emitting component and then forming a light transmissive material layer disposed on the fluorescent material layer. Independent claims 1 and 18, for example, make no reference to a light transmissive material layer. Nor do either of these claims exclude use of a light transmitting material layer, either on the phosphor layer, or elsewhere in the light emitting device.

Accordingly, it is requested that the restriction requirement be withdrawn.

102(b) and 103(a) Rejections

Claims 1-4, 6, 7, 9-13, 15, and 16 stand rejected under 35 U.S.C. §102(b) as being anticipated by Lowery, U.S. Patent No. 5,959,316.

Claims 5 and 14 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Lowery, U.S. Patent No. 5,959,316.

Notice of Copending Action

Applicants would like to draw the Examiner's attention to a copending action and references cited therein:

Application Serial No.: 09/642,901
Filed: August 21, 2000

The Claims Distinguish Patentably Over the References of Record

Claim 1 calls for a light source including a light emitting component which emits light and a phosphor-containing material positioned to receive light emitted by the light emitting component. The phosphor-containing material has a thickness which varies in relation to an intensity of the light emitted by the light emitting component. The uniformity of color emission is improved as compared with a uniform thickness layer.

The **Lowery** patent does not suggest a phosphor-containing material which has a thickness that varies in relation to an intensity of the light emitted by the light emitting component. Although Lowery does show a variation in thickness of a prior art phosphor layer **24** (Fig. 2), the layer does not vary in relation to the intensity. This is clearly seen by the fact that the prior art lamp produces light which varies in color, as discussed with relation to Fig. 1 (col. 2, lines 22-26). In some regions, the light produced is blue, while in others, a yellow light is emitted. This is clearly because the thickness of the phosphor layer is not varying in relation to the light intensity, but with some other factor, primarily the shape of the LED chip. As a result, the light emitted is not generally uniform, and is not improved as compared with a uniform thickness layer, as indicated by Lowery (col. 3, lines 7-18).

Accordingly, it is submitted that claim 1 and claims 2-9 dependent therefrom differ patentably and unobviously over the references of record.

Claim 10 recites a light source including a phosphor-containing material having a thickness which varies in proportion to the light passing through the phosphor material, the thickness being greater in regions where the intensity of the light emitted by the light emitting component is higher and lesser in regions where

the intensity of the light emitted by the light emitting component is lower.

Lowery does not suggest a light source in which a phosphor-containing material has a thickness which varies in proportion to the light passing through the phosphor material. The thickness of the phosphor layer of Lowery's prior art lamp does vary in thickness, but not in proportion to the intensity of the light. As a result, the light emitted is of varying color intensity, and is not generally uniform.

Accordingly, it is submitted that claim 10 and claims 11 and 16 dependent therefrom differ patentably and unobviously over the references of record.

Claim 12 recites a light source with a phosphor-containing material having a thickness which is greater in regions where the intensity of the light emitted by the light emitting component is higher and lesser in regions where the intensity of the light emitted by the light emitting component is lower. The phosphor-containing material is formed from a material which includes a phosphor and a light-curable material which is cured by light emitted by the light emitting component.

Lowery makes no suggestion of forming a phosphor-containing material from a material which includes a phosphor and a light-curable material which is cured by light emitted by the light emitting component. The phosphor layer formed from the claimed method is very different from that of Lowery in that the layer changes thickness in relation to the intensity of light, and avoids the color shift observed by Lowery in regions where the phosphor layer is not of appropriate thickness for the intensity of the light passing through it (either too thick or too thin). The lamp produced by the presently claimed process overcomes these problems by curing the light with the LED itself, thus providing a cured

thickness which corresponds to the intensity of light through each region.

Accordingly, it is submitted that claim 12 and claims 13-15 and 17 dependent therefrom differ patentably and unobviously over the references of record.

Claim 18 calls for a method of improving color distribution of a light source emission. The method includes energizing the light emitting component for a sufficient period of time to cure a portion of the curable material and removing remaining uncured curable material.

Lowery makes no suggestion of forming a light source by this method. Rather. Lowery teaches against forming a light source which can result in a phosphor layer of non-uniform thickness.

Accordingly, it is submitted that claim 18 and claims 19-22 distinguish patentably and unobviously over the references of record.

New claim 23 recites a light source with improved color distribution in which a phosphor containing layer is formed by a method which includes energizing the light emitting component for a sufficient period of time to cure a portion of the curable material and removing remaining uncured curable material.

Lowery makes no suggestion of forming a lamp by this method. The presently claimed lamp has superior light uniformity to the prior art lamp of Lowery, particularly when the LED output is extremely non-uniform, because the changing thickness of the phosphor layer is able to compensate for non-uniformities in the light output from the die. The process thus results in a phosphor layer which accurately reflects the light intensity variations, and is not due simply to the shape of the die, as is Lowery's. Lowery's prior art phosphor layer does not accurately correspond to the light intensity variation and thus produces a light output which

is non-uniform. The present lamp is able to achieve a high degree of uniformity not possible with either the prior art or otherwise disclosed lamps of Lowery.

Accordingly, it is submitted that claim 23 distinguishes patentably and unobviously over the references of record.

CONCLUSION

For the reasons set forth above, it is submitted that claims 1-23 distinguish patentably and unobviously over the references of record. An early allowance of all claims is earnestly solicited.

Respectfully submitted,

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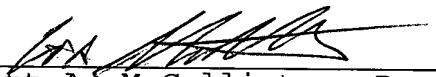

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Application Serial No. 09/633,527
Filed August 7, 2000

VERSION OF CLAIMS WITH MARKINGS TO SHOW CHANGES MADE
September 27, 2002

Please amend claim 1, as follows:

1. (Amended) A light source comprising:

a light emitting component which emits light; and

a phosphor-containing material positioned to receive light emitted by the light emitting component, the phosphor-containing material converting at least a portion of the light to light of a different wavelength, the phosphor-containing material having a thickness which varies in relation to an intensity of the light emitted by the light emitting component, whereby the uniformity of color emission is improved as compared with a uniform thickness layer.

Please amend claim 10, as follows:

10. (Amended) A light source comprising:

a light emitting component which emits light; and

a phosphor-containing material positioned to receive light emitted by the light emitting component and converting a portion of the light to light of a different wavelength, the phosphor-containing material having a thickness which varies in proportion to the light passing through the phosphor material, the thickness being [is] greater in regions where the intensity of the light emitted by the light emitting component is higher and lesser in regions where the intensity of the light emitted by the light emitting component is lower.

Please place claim 12 in independent form, as follows:

12. (Amended) [The] A light source of [claim 10, wherein] comprising:

a light emitting component which emits light; and

a phosphor-containing material positioned to receive light emitted by the light emitting component and converting a portion of the light to light of a different wavelength, the phosphor-containing material having a thickness which is greater in regions where the intensity of the light emitted by the light emitting component is higher and lesser in regions where the intensity of the light emitted by the light emitting component is lower, the phosphor-containing material [is] being formed from a material which includes:

a phosphor; and

a light-curable material which is cured by light emitted by the light emitting component.

Please amend claim 18, as follows:

18. (Amended) A method of improving color distribution of a light source emission, the method comprising[;]:

forming a layer of a phosphor-containing curable material [on] over a light emitting component;

energizing the light emitting component for a sufficient period of time to cure a portion of the curable material; and

removing remaining uncured curable material.

Please add new claim 23, as follows:

23. (New) A light source with improved color distribution comprising:

a light emitting component which emits light; and

a phosphor-containing material positioned to receive light emitted by the light emitting component and converting a portion of the light to light of a different wavelength, the phosphor-containing material having a thickness which is greater in regions where the intensity of the light emitted by the light emitting component is higher and lesser in regions where the intensity of the light emitted by the light emitting component is lower, the phosphor containing layer being formed by a method which comprises:

forming a layer of a phosphor-containing curable material over the light emitting component;

energizing the light emitting component for a sufficient period of time to cure a portion of the curable material; and

removing remaining uncured curable material.